virus (anti-EBV) antibody titers were measured for NPC patients and age-sex-matched neighborhood controls. Smoking, use of herb drugs, use of oils and balms, working in poorly ventilated areas and anti-EBV antibody titers were found to be associated with NPC. A further study of the dual interactions of these factors to the risk of NPC was conducted by standardizing the other three factors. Except working in poorly ventilated areas and use of herb drugs, all the combinations were shown to be synergistic. The synergistic actions were especially noticeable with smoking and other factors. The possible etiologic mechanisms of NPC are also discussed.

Cervical cancer in Panama. W. C. Reeves,* R. Britton, P. Valdez and A. S. Benenson (Gorgas Memorial Laboratory, Panama, R. P.).

Cancer is Panama's leading cause of certificated deaths. The Panamanian National Oncology Institute responded to the problem by creating a population-based National Cancer Register in 1974. This registry allowed recognition of an unusually high uterine cervical cancer incidence. Cervical cancer constituted 31% of diagnosed Panamanian cancers between 1974–1976. Panama's age-adjusted cervical cancer incidence (128/100,000) over these three years greatly exceed rates reported from other countries. Significantly different incidences occurred between Panama's nine provinces. Women from the small, isolated province of Herrera had a cervical cancer risk almost twice that of Panama province and nine times the risk of neighboring Veraguas province. The same range and magnitude of relative risk applied when contrasting in situ or invasive cancer rates by province. Moreover, Herrera province had an atypical invasive cancer age-specific incidence curve, most cases occurred in 20–39-year-olds. Possible confounding factors including hospital-treatment room access, physician/population and pap smear rates do not account for the high cervical cancer incidence or provincial clustering. The authors are planning a case-control study in Herrera province.

Cancer mortality in the Old Order Amish. R. F. Hamman,* J. I. Barancik and A. M. Lilienfeld (Johns Hopkins School of Hygiene, Baltimore, MD 21205, and Case Western Reserve U., Cleveland, OH 44106).

Mortality was examined in the Old Order Amish, a religious, cultural and genetic isolate from US society, to learn if the combined effects of lifestyle and inbreeding resulted in unusual patterns of malignant neoplasm deaths. Death certificates and private Amish censuses were used to develop mortality rates for the Amish in Indiana, Ohio and Pennsylvania settlements, and these rates were compared to rates for the non-Amish in the same counties. The multiplicative model of Breslow and Day (1975) was used to estimate the Amish/non-Amish mortality rate ratios by sex, age group and cause of death for all States combined. The rate ratios for all cancer for males were as follows: ages 0–9 years, 1.64; 10–39, 1.76; 40–69, 0.44; and 70+, 0.73. For females, they were: 0–9, 1.51; 10–39, 0.48; 40–69, 0.98; and 70+, 0.81. A number of differences in site-specific patterns were also found in the Amish. For Amish males, leukemia and lymphoma rates were found to be greater than those in the non-Amish males, while lung, rectum and prostate cancer rates were less. In Amish females, breast and stomach cancer rates were greater than in the non-Amish females, while genital and ovarian cancers were less. A review of a sample of medical records did not reveal significant differences in the quality of Amish and non-Amish death certificates.

Cancer mortality in Louisiana parishes and potable water sources: Update. M. S. Gottlieb,* C. Shear, D. Seale and R. Stedman (Tulane U., New Orleans, LA 70112).

Mississippi River water in Louisiana has been implicated in the excess cancer mortality. A case-control death certificate study of selected parishes in 1965–1975 was undertaken to determine associations between potable water sources and selected site-specific cancers. Cases and controls were selected within parish groups with different water sources and similar industrialization characteristics, and matched on age, race, sex, and year of death. Preliminary results based on an unverified parish water source indicator were reported earlier. Individually verified water source information completed for one group of parishes confirms the following pattern of excess relative risk (surface vs. all other sources): bladder, 1.75, kidney, 2.54 and rectum, 1.79 (all $p < 0.05$), and also large intestine 1.42. Using a multiple logistic model for large intestine, birthplace in parish was found to elevate the surface water risk. An increase in risk of 1.66 associated with ground chlorinated water was noted for liver cancer. Increasing risk with 10+ years of exposure was noted for liver, brain, and kidney cancers. Water-associated risks were in excess of occupational risks. The above observations indicate that 1) surface water ingestion is associated with excess risk, 2) this risk varies by site, and 3) excess risk is not limited to surface. The attributable risk per cent due to water source may explain some of the reported excess cancer mortality.

Cancer and drinking water quality in North Carolina: A case-control approach utilizing prior water use exposure gradients. R. Struba* and C. Shy (U. of N. Carolina, Chapel Hill, NC 27514).

In numerous ecologic studies and one case-control study, previous investigators have found higher risks for gastrointestinal and urinary bladder cancer among persons served by drinking water containing synthetic organic pollutants. However, in these studies the issues of latency in carcinogenesis and previous use of the drinking water were not considered. This study involves four separate site-specific case-control studies in which cases of colon, rectum, pancreas, and urinary bladder cancers and a series of matched controls are being compared on the quality of drinking water which they received. Cases and controls were selected from state mortality records, and entrance into the study population was restricted to persons who were born and died in this